DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anastasijevic et al. (US Patent no. 5,679,240) in view of Virtanen et al. (US Patent no. 6,342,136).

With regard to claims 1, 2, Anastasijevic discloses an electrolytic process and apparatus for electro-winning and electrodepositing copper from an electrolyte solution containing the metal in ionogenic form (abstract; col. 1, lines 5-28), in which the electrolyte is passed through an electrolysis plant comprising at least one electrolytic cell (col. 3, lines 54-65) which in an electrolyte tank (1) for receiving the electrolyte (4) has at least two electrodes (K, A; figure 1) serving as an anode (A) and cathode (K), which are alternately arranged at a distance from each other (col. 2, lines 36-41),

wherein during operation of the electrolysis the at least one cathode (K) is immersed into the electrolyte (4; figure 1) over a length of at least 1 meter (col. 1, lines 47-57); the electrodes having a horizontal hanger bar (6; figure 2) with a first end and a second end at the edge of the electrolyte tank (1) used to conduct current from an external DC source to the electrodes (col. 3, lines 58-62) but fails to teach wherein two contact bars are provided, the first end of the hanger bar of the cathodes resting on one of the two contact bars via a two-line contact and the first end of the hanger bar of the anodes resting on the other one of the two contact bars via a two-line contact, the second end of the hanger bar of each electrode resting on an equalizer bar disposed on one of the contact bar.

Virtanen teaches a busbar construction for electrolytic cells (abstract) comprising distributing current between the anodes (1) and cathodes (2) of the cells (A, B; figures 1-2) by providing two contact bars at an edge of the electrolytic tanks (A, B) , the first end of the hanger bar (4) of the cathodes (2) resting on one of the two contact bars (6) via a two-line contact (bulges 9) and the first end of the hanger bar (3) of the anodes (1) resting on the other one of the two contact bars (6) via a two-line contact (bulges 8), the second end of the hanger bar of the cathode (2) resting on a cathode equalizer (11) disposed on the contact bar (6) and the second end of the hanger bar (3) of the anode (1) resting on an anode equalizer (12) disposed on the contact bar (7; figure 2; col. 3, line 48 to col. 4, line 45) in order to be able to connect multiple electrolytic cells in series (col. 2, lines 16-38), evenly distribute current between the electrodes, simplify the cell construction by having all the parts with constant cross-sections lengthwise in the cell

as well as to choose and change the spacing between the electrodes freely (col. 1, line 5 to col. 2, line 19). Therefore, one having ordinary skill in the art would have found it obvious to replace the contact bars at the end of the electrolytic tank of Anastasijevic, with the busbar construction of Virtanen in order to be able to connect multiple electrolytic cells in series, obtain an uniform current distribution between the electrodes, simplify the cell construction by having all the parts with constant cross-sections lengthwise in the cell as well as to choose and change the spacing between the electrodes freely.

With regard to claim 3, even though Anastasijevic does not explicitly teach wherein at least one cathode is immersed into the electrolyte with a cross-sectional area of 2 meter^2, Anastasijevic teaches wherein during electrolysis operation, the at least one cathode is immersed in to the electrolyte over a length of at least 1 meter (col. 1, lines 47-57). Anastasijevic further teaches wherein the associated cathodes may have a corresponding large surface area so that the deposition rate will be improved (col. 1, lines 47-57). Therefore, one having ordinary skill in the art would have found it obvious to immerse a desired/large surface area of the electrodes into the electrolyte, as taught by Anastasijevic, in order to improve the deposition rate and efficiency of the process thereby.

With regard to claim 4, even though Anastasijevic fails to explicitly teach wherein the at least one electrolytic cell has more than 60 cathodes, particularly preferably more than 100 cathodes, and quite particularly preferably 114 cathodes, Anastasijevic discloses wherein multiple anodes disposed alternately with a plurality of cathodes

(figure 1; col. 2, lines 37-41). It is well known in the art to increase the amount of electrodes in an electrolytic cell for the extraction of metal under varying conditions. In addition, it has been held by the court that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CPA 1960).

With regard to claim 5, even though Anastasijevic fails to explicitly teach wherein the electrolysis is performed at a current density of more than 200A/m^2, particularly preferably between 250 and 370 A/m^2, Anastasijevic discloses that the process can be operated at high and very high current densities so that the anode can be used for an electrolysis resulting in high metal deposition (col. 1, lines 25-28). Therefore, one having ordinary skill in the art would have found it obvious to adjust the current density according to user's requirements in order to obtain a high metal deposition and increase the efficiency of the process thereby.

With regard to claim 7, Virtanen further teaches wherein the contact bars (6) have an at least substantially trapezoidal indentation (figures 1-2) on which rest the respectively first ends of the hanger bars (3, 4) with a contact surface having at least substantially rectangular cross-section (figures 1-2).

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anastasijevic in view of Virtanen, as applied to claim 1, and further in view of Juric et al. (US Patent no. 2003/0173214).

With regard to claim 8, the modified Anastasijevic discloses wherein for protection against corrosion, the copper carrying bar (6) is surrounded by a titanium sheath (col. 3, lines 60-65) instead of a steel sheath.

Juric teaches an aluminum reduction cell for the production of a metal which includes a plurality of collector bars (21; figure 1; abstract) wherein, for the purpose of controlling current distribution, each collector bar includes a core of relatively high electrical conductivity material, such as copper, and a housing of a more mechanically and chemically resistant material, i.e. steel, than the core material (abstract; paragraphs 12 and 33). This will also improve the spatial current density and therefore the stability of the electrolytic cell (paragraphs 14-15). Therefore, one having ordinary skill in the art would have found it obvious to replace the titanium sheath covering the copper core of the modified Anastasijevic, with a steel sheath, as taught by Juric, because steel is a mechanically and chemically resistant material which along with the high electrical conductive copper core will control the current distribution, improve the spatial current density and therefore the stability of the electrolytic cell.

5. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anastasijevic in view of Virtanen, as applied to claim 1 above, and further in view of Nikola (DE 199 40698).

With regard to claims 11-12, the modified Anastasijevic discloses all of the limitations discussed above but fails to explicitly teach wherein the contact bars and/or equalizer bars are cooled with water.

Nikola discloses an electrolysis plant comprising an electrolyte container (1) wherein the electrodes have a horizontal hanger bar (8) provided with two bus bars (6, 7) arranged at the edge of the container (1; see figure 2), the bus bars (6, 7) are cooled by cooling liquid passing through the bars (6, 7; page 1, paragraph 6) and have terminals to direct current source to several electrodes immersed in the electrolyte (page 1, paragraph 1; paragraph 8 – under description of figures); wherein an end of the hanger bar (8) of the electrodes rests on an equalizer bar (8b) which is arranged on one of the two contact bars (6; figures 3 and 4) and electrical conductive element (18) disposed on anode contact bar (7; figure 9). This configuration minimizes the transition resistance for the current flow (page 1, paragraph 5). Therefore, one having ordinary skill in the art would have found it obvious to flow a cooling liquid through the contact bars, as taught by Nikola in the electrolysis plant of the modified Anastasijevic, in order to enhance the electrolytic process by maintaining the device at a predetermined operating temperature.

6. Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anastasijevic in view of Virtanen and Nikola, as applied to claim 11 above, and further in view of Gensini et al. (US Patent no. 5,651,024).

With regard to claims 13-15, the modified Anastasijevic discloses all of the limitations discussed above but fails to teach wherein the water is passed through the cooling water channel in a turbulent flow, wherein the contact bars to be cooled have two separate cooling circuits, one of which (primary circuit) is at least partly provided in

the contact bars to be cooled, an which are both connected with each other by a heat exchanger and wherein the primary circuit is fed with purified water and the second cooling circuit is fed with crude water.

Gensini discloses a cooling mechanism comprising a contact rod made of copper connected to a steel electrode so as to form a copper-steel structure (col. 2, line 56 to col. 3, line 2), the copper cooling means consist of a plurality of annular columns or spiral elements starting from a strongly cooled common base, the common base includes a heat exchanger means of high efficiency (col. 3, lines 27-31); the cooling system includes a central pipe for the discharge of water and an outer annular pipe to feed water (col. 5, lines 16-20) in which the cooling water follows an obligatory path so as to increase the heat exchange surfaces between the cooling system and the copper cooling means (col. 5, lines 21-26; figures 1-3). This configuration improves and increases the efficiency of the cooling action of the device as well as its work life and prevents possible operational accidents (col. 1, lines 14-21). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to incorporate a cooling system as taught by Gensini, because it would improve and increase the efficiency of the cooling action of the device as well as its work life and would prevent possible operational accidents. Even though the modified Anastasijevic fails to explicitly teach wherein the cooling water is passed in a turbulent flow, one having ordinary skill in the art would have found it obvious to modify the velocity of the water passing through the cooling channels in order to obtain different flow regimens,

either turbulent or laminar, and increase the efficiency of the heat exchanging process according to user's requirements.

With regard to claims 16 and 17, Anastasijevic discloses wherein the electrolytic cell is provided with a flow distributor through which operation of the cell, electrolyte solution is introduced into the cell (col. 2, lines 55-59; col. 3, lines 53-60), wherein the fluid distributor/inlet (2) is disposed at the lower end of the cell (1) and the fluid is introduced into the cell through the distributor (2) below the lower end of the electrodes (K, A; see figure 1).

7. Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anastasijevic in view of Virtanen, Nikola and Genisini, as applied to claim 16 above, and further in view of Andersen et al. (US Patent no. 4,098,668).

With regard to claims 18-20, the modified Anastasijevic fails to explicitly teach wherein the fluid distributor consists of two tubes arranged substantially parallel to the longitudinal sides of the electrolytic cell, which at their surface each have one or more fluid outlet holes and whose first ends are each connected with a fluid supply conduit, wherein the fluid distributor has about 1 to 5, particularly preferably about 1 to 2 fluid outlet holes per electrode pair and cell side provided in the cell, whose arrangement is substantially adjusted to the spaces between the electrodes.

Andersen teaches an electrolytic apparatus and process for extraction of metals comprising wherein the fluid distributor consists of two tubes/pipes (24, 25) arranged substantially parallel to the longitudinal sides of the electrolytic cell (figures 1, 6 and 8),

which at their surface each have one or more fluid outlet holes (27 and 26, respectively) and whose first ends are each connected with a fluid supply conduit (19; figure 1; col. 3, lines 42-45), wherein the fluid distributor has at least one outlet hole having a diameter in the range of 1.59 to 12.7 mm (col. 4, lines 53-57) per electrode pair and cell side provided in the cell (figures 5 and 7), whose arrangement is substantially adjusted to the spaces between the electrodes to avoid turbulence (col. 3, lines 45-49). This configuration provides a process and apparatus by which pure metal may be extracted in a simple, efficient and yet extremely economic manner (col. 2, lines 8-12). Therefore, one having ordinary skill in the art would have found it obvious to modify the fluid distributor in the electrolytic cell of the modified Anastasijevic, as taught by Andersen, in order to provide a process and apparatus by which pure metal may be extracted in a simple, efficient and yet extremely economic manner.

With regard to claim 21, Andersen further teaches wherein the electrolytic cell has two electrolyte outlets (23, 15; figure 1).

8. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anastasijevic in view of Virtanen, Nikola and Genisini, as applied to claim 16 above, and further in view of Hiai et al. (US Patent no. 5,865,967).

With regard to claim 22, even though the modified Anastasijevic fails to explicitly teach wherein the cathodes have an indentation of V-shaped cross-section at their lower longitudinal edge, it is well known in the art to modify the shape of the electrodes

for the extraction of metal under varying conditions, as taught by Andersen (col. 2, line 66 to col. 3, line 1) and evidenced by Hiai.

Hiai discloses a method and apparatus for electrowinning metals (abstract) wherein the electrode may have an indentation of V-shaped cross-section at their lower longitudinal edge in order to enable easy peeling of the precipitated metal from the cathode plate and improves the shielding performance of the insulator against the electrolytic precipitation (col. 1, lines 37-58). Therefore, one having ordinary skill in the art would have found it obvious to modify the shape of the cathode, as taught by Hiai, in the electrolytic cell of the modified Anastasijevic, in order to enable easy peeling of the precipitated metal from the cathode plate and improves the shielding performance of the insulator against the electrolytic precipitation. In addition, it has been held that the configuration or shape of a claimed device is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed device is significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Response to Arguments

9. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection. The applicant argues that neither hanger bar (8) of Nikola is electrically connected to both the anode (7) and the cathode (6), nor to each other. Nikola fails to disclose or suggest distributing current between the anode and the cathode as required by claim 1. In addition, the second end of the hanger bars

do not rest on an equalizer bar disposed on one contact bar. Therefore, after further search and consideration, a new ground of rejection has been presented above.

Conclusion

10. In view of the new grounds of rejection presented above, this Office Action has been made Non-Final.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ZULMARIAM MENDEZ whose telephone number is (571)272-9805. The examiner can normally be reached on Monday-Friday from 9am to 5pm.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D Wilkins, III/

Primary Examiner, Art Unit 1723

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